REMARKS

The Examiner is thanked for the thorough and complete job in the review of the Office Action and the Figures. It is clear the Examiner took significant time to study the specification and claims and the detail which was provided in the Office Action as well as the time taken by the Examiner is appreciated.

The Examiner indicated claims 5, 6, 10, 11 and 17 would be allowable if rewritten in independent form. Accordingly, enclosed in this response is new claim 34 which corresponds to claim 5 as originally submitted. The claim should therefore be allowed as indicated by the Examiner.

A majority of the claims were rejected over a combination of two or more references under 35 U.S.C. § 103. In particular, claims 1-4, 7 and 12-16 as well as other claims were rejected over a combination of Javanifard et al. '735 patent in view of Rader et al. '422 patent. The Rader et al. '422 patent was issued on January 7, 2003 based on an application filed on November 21, 2000. The present application bears a U.S. filing date of January 15, 2002 which was prior to the granting of the Rader et al. '422 patent. Accordingly, the Rader et al. '422 patent qualifies as prior art only under Section 102(e) and does not qualify as prior art under Section 102(b) or any other section.

The present invention was made and completed prior to November 21, 2000, as will now be shown.

Attached hereto is a Declaration from the Inventor Domenico Pappalardo in which he states that the present invention was made prior to November 21, 2000. In particular, the Declaration attaches actual patent disclosure documents as Exhibits A and C which correspond to the patent disclosures which were submitted to the internal ST Patent Department for filing the present application. As stated in the Declaration, the invention was completed sufficiently prior to November 21, 2000 that even the submission of the patent proposal to ST for filing is dated prior to November 21, 2000.

Since the Declaration and attached exhibits are sufficient to remove the Rader et al. '422 patent as a prior art reference, further discussions regarding Rader et al. '422 are not

necessary at this time. Of course, applicants believe that the claims as submitted herewith are patentable even if Rader et al. '422 were of record.

The drawings were objected to and the Examiner requested that the drawings show each claim feature. In particular, the Examiner requested that the features of "auxiliary capacitor as coupled with a fourth transistor and 'phase selecting switches'" should be shown in the drawings. The Examiner also requested that the phrase "optical" be replaced with the word "optimal" within Figure 7 of the application as filed so the drawings would agree with the text.

Applicants submit herewith replacement drawings with the changes requested by the Examiner. The auxiliary capacitor, as well as the fourth transistor and the phase selecting switches were shown in the drawings as originally filed. Accordingly, no changes to the drawings have been made with respect to these elements as applicants will now explain. Within the figures, Figures 11, 12 and 13 have now been labeled as prior art. As the specification states on page 4, lines 15-20, Figures 11, 12 and 13 are schematic diagrams of charge pumps according to the prior art. They are also described as prior art within the body of the specification (see for example pages 7 and 8). In addition, an amendment to Figure 7 has been made to place the text words within the block 50 so that the block corresponds to the portion of Figure 6 as appropriate and also agrees with the text. Additionally, typing errors in Figures 2, 3A, 4A, 5A and 15 have been corrected so that the figures agree with the text. In particular, switch 24 was labeled 24-f4 on the left hand side of the charge pumps so that there were two "24-F4" switches. This has been corrected to properly refer to the figure as 24-F2 so that the drawings agree with the text of the specification as filed. In addition, the transistors T2 and T3 have been labeled in Figure 12 and the transistors and capacitors have been labeled in Figure 15 as 115 and TS2 and the connection dot has been placed at the upper terminal of capacitor 114 which is coupled to signal FP2 between transistor TP3 and TP within block 124 of Figure 15. These changes are also made to bring the drawings into conformance with the specification so that the drawings agree with the text description of the application as filed. The adding of the reference numbers and typographical corrections to the drawings does not represent new matter because the material was previously present within the specification and the claims of the application as filed.

The Examiner rejected claims 12-17, 19-22 and 24-25 under 35 U.S.C. § 112, first paragraph for failing to comply with the enablement requirement. For each of these rejections, the Examiner described the respected issues with respect to these claims. Again, the Examiner is thanked for the specific questions as asked so that they can be addressed in this reply. Applicant traverses the rejection and requests reconsideration.

The claims form a part of the original technical disclosure. Applicants accordingly rely upon the claims as containing subject matter describing in the invention and as part of the original specification as filed. Accordingly, applicants are making minor amendments to the specification to place the language of the claims within the specification so that the claims have support. These changes will now be explained. Claim 12 has been amended to delete the word "second" as occurring in the penultimate line. The claim therefore refers only to a plurality of phase selecting switches. One example of the phase selecting switches are the multiplexer 76 as shown in Figure 8. As described in the specification at page 6, lines 21-28, a phase assigner 72 is composed of several multiplexers 76. As is clear in claim 12, these are the phase selecting switches which are referred to which correspond to those shown in Figure 8. In order to bring the text into agreement with the claims, the phrase "which act as phase selecting switches" has been added to the specification on page 6, line 22.

This is merely moving the text which was found in original claim 12 into the specification at the correct location. Of course, all of claim 12 could be repeated word-for-word into the specification but this seems to be unduly long and burdensome since only a small portion of claim 12 needed clarification. Such phase selecting switches were part of the original application as filed since they are shown in the figures and also contained in original claim 12. Entry of the amendment is requested in order to bring the specification into accordance with the figures and claims as originally filed.

Of course, the multiplexers are merely one example of phase selecting switches and other acceptable phase selecting switches may be used of which many are available to those of skill in the art given the description herein.

The Examiner stated that with respect to claim 19, the "auxiliary capacitor" was not described in the text. The auxiliary capacitor is that capacitor shown in Figure 15 within

block 126 connected to the signal line FS1. Claim 19 properly describes this as the auxiliary capacitor and provides the correct description thereof stating that a second and third transistor are coupled between one of the pumping lines and the first terminal of an auxiliary capacitor. Accordingly, the figures and the claims as filed properly describe this capacitor. In order to comply with the Examiner's request and make the text in agreement with the figures and claims, a sentence is added on page 9, line 27 which states that the auxiliary capacitor 115 has a first terminal coupled to the terminal of TS1 and the other terminal connected to the signal FS1 as shown in Figure 15. Accordingly, claim 19 now finds support in the specification since the relevant portions of claim 19 have been inserted back into the specification.

Claim 22 has been amended to delete the reference to "auxiliary transistor" and use therefore the correct terminology from claim 19 which was "fourth transistor." This fourth transistor is TS2 which receives the phased signal ENP within block 126 as is described on page 9, lines 24-31 of the application as filed. This amendment to the specification does not constitute new matter because the figures as originally filed showed the circuit and the claim properly described the circuit. Accordingly, the text is merely amended in order to bring it into conformance with the figures and claims as originally filed and does not constitute new matter.

The Examiner stated that claim 24 recited a structural relationship which was not shown in the figures. The Examiner correctly points to block 124 within Figure 15 as corresponding to the structure of claims 24 and 25. Within Figure 15, block 124 of the first transistor is T1, the second transistor is TP2, the third transistor is TP3, the fourth transistor is the transistor TP connected to the signal ENS and having its drain coupled to the gate of transistor T1 and the fifth transistor is the transistor TP having its gate coupled to ENS and its drain coupled to the first terminal of the capacitor 114 which is driven by the signal FP2. Claim 24 and the application as filed describes the first terminal of the capacitor connected to FP2 as being connected to the transistor TP and TP3. Accordingly, a connecting dot at this node was described as being present and the amended figure has placed this dot so that the drawings now agree with the specification and claims as originally filed. In addition, the Examiner can see the location of this dot by looking at Figure 12. A portion of this block 124 was well known in the prior art. Figure 12, block 116, shows a transistor T3 and a capacitor cb having a connection dot

at the top of the capacitor driven by the signal FN2. This node therefore is a common node between the capacitor cb and the transistor T3. The connecting dot was present in Figure 12 as filed and a similar connecting dot should be present in Figure 15 so that it agrees with that portion of Figure 12 and also so that it agrees with the text as originally filed. As described in the specification, block 124 is positioned at the same location as block 116 of the prior art and is structured slightly differently by the addition of the two transistors TP which are both driven by the signal ENS. One embodiment of the present invention therefore adds these two additional transistors in order to provide the switching network.

Claims 1, 2 and 26-30 were rejected under 35 U.S.C. § 102 under UK Patent Application No. 2,296,605 to Kim, referred to herein as Kim '605. Applicants have amended claims 1 and 26 so as to define over the Kim '605 reference. In particular, claim 1 has been amended to add a second pumping capacitor having a particular connection as well as a second switch and a third switch having particular connections with respect to the first and second pumping capacitors. In particular, a third switch is provided which is structured to disrupt between the first terminals of the first and second pumping capacitors. Similar changes have been made to claim 26 which is a method claim describing the operation of the present invention.

The claim, as amended, is patentable in light of Kim '605 as will now be explained with respect to claims 1 and 26. Turning first of all to Figure 2 which is a figure showing one embodiment of the present invention, the distinctions will now be described. The embodiment of Figure 2 shows a plurality of division switches 20. Some of these switches correspond to the first, second and third switches as claimed in claims 1 and 26 as amended herein. In particular, one example of the first switch is switch 20-T2. An example of the second switch is switch 20-T1 and an example of the third switch is switch 20-T7. Each of these switches has the function of allowing, in predetermined time intervals the charge division among the capacitors connected thereto which can be realized in different ways. The Kim '605 patent is structured drastically differently. In the Kim '605 application, variable stages are obtained by the use of more charge pumps each formed of one or more stages connected in cascade and in addition, the very stages being connectable by a switching circuit 2 as shown in Figure 3 of the Kim '605 application. These switches 2 can be more correctly thought of as reconfiguration

switches. The Kim '605 application is made of a certain number of stages, because the switches are connected between two pumping capacities. They are not connected between a pumping capacity and division switch as shown and claimed in the present invention. The present invention has a certain number of pumping capacities connected by means of a suitable division switch network. A greater flexibility in connecting the stages is permitted far beyond that which is available in the Kim '605 application. For example, in the present invention some switches are left open and the remaining ones together with the pumping capacities will be the stages for the predetermined configurations so that the charge pump can reach a certain number of stages.

In particular, the present invention permits the first terminals of the two capacitors to be coupled to each other via switch 20-T7, something which is not permitted in the Kim '605 application. Looking at Figure 3 of the Kim '605 application it can be seen that the two pumping capacitors in each stage have the first plate coupled to the control gate of a particular transistor. The same plate is also coupled to the output of another transistor which, when switched on, can couple the respective plate to the input voltage Vdd. The plates of the capacitor are therefore connected only to two places, the gate of a transistor and the output of a transistor. The gate of a transistor is a high impedance device which does not permit a voltage through. There is no transistor which can be selectively turned on to connect the plates of the first and second capacitors to each other. Instead, Kim '605 uses a configuration in which the plates, upon being charged, drive the gate of another transistor which in turn is connected via a diode to the input line Vdd. Thus, the capacitors can connect a particular input line to an output but there is no transistor which can connect the capacitors to each other. Accordingly, as can be seen in the Kim '605 application, the variable stage structure is obtained merely by means of more charge pumps, each formed of one or more stages connected in cascade, whose sole aim is that of connecting the charge pumps in order to realize a single charge pump with a higher number of stages or with more power. Unfortunately, when these switches are on they are in series with the various charge pumps of the contiguous stages, thus decreasing their efficiency and making reconfiguration limited to only a small number of choices.

The present invention is drastically different. For example, in Figure 3 the division switches T7-T11 are left open and the remaining switches together with the pump

capacities will be six charge pumps all in one stage arranged in parallel. On the other hand, in Figure 4A, the switches T1, T3, T5, T8, T11, T12, T14 and T16 are left open and the remaining switches together with their pumping capacities will be three charge pumps at two stages arranged in parallel. Of course, a large number of reconfigurations are possible as described in the specification and all of them are not described in these remarks. The distinction is that the location of the switches improves the efficiency of the charge division because it reduces the series resistance during the division itself. Within the patent, at least two different solutions are suggested. By suitable choosing the division switch network, as the example of Figure 2, it is possible to keep the correct division switches open for all necessary stages at the time. This structure surely functions by using such division switches or diodes as shown in the other figures of the present application, such as Figures 15 and 16. A second solution is the division switch 126 of Figure 15. This switch is controlled by signals ENS and ENP. This switch also provides the desired function independently from the architecture used. Indeed, it can be understood that the schematic of Figure 14 is one particular case of the broad example of Figure 2 and it differs from the schemes as suggested in Kim '605 and other prior art references because the switches 126 are connected between two pumping capacities and not between a pumping capacity and a division switch. Therefore, switches 126 should be thought of as division switches and not reconfiguration switches.

New claims 31-33 are added as dependent from claim 1 to further distinguish over the art. These claims make clear that the phases of the respective capacitor, can be chosen independent of each other, same thing Kim cannot achive.

The present invention is therefore patentable over the prior art of record and allowance of all claims is respectfully requested. If the Examiner has questions, she is invited to call the attorney at the below-referenced number.

The Commissioner is authorized to charge any additional fees due by way of this Amendment, or credit any overpayment, to our Deposit Account No. 19-1090.

Respectfully submitted,

SEED Intellectual Property Law Group PLLC

David V. Carlson
Registration No. 31,153

DVC:lcs

Enclosures:
Postcard
11 Sheets of Drawings (Figures 1-16
Declaration of Domenico Pappalardo

701 Fifth Avenue, Suite 6300
Seattle, Washington 98104-7092
Phone: (206) 622-4900
Fax: (206) 682-6031

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